

PCT

WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau



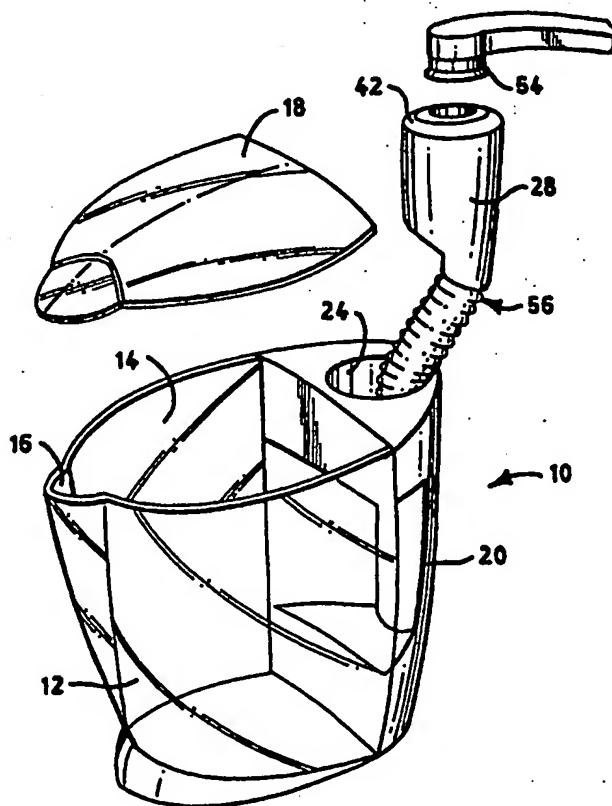
INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 7 : C02F 1/00		A1	(11) International Publication Number: WO 00/37363
			(43) International Publication Date: 29 June 2000 (29.06.00)
(21) International Application Number: PCT/US99/29859			(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).
(22) International Filing Date: 16 December 1999 (16.12.99)			
(30) Priority Data: 60/112,722 18 December 1998 (18.12.98) US 09/435,726 8 November 1999 (08.11.99) US			
(71) Applicant: KIMBERLY-CLARK WORLDWIDE, INC. [US/US]; 401 N. Lake Street, Neenah, WI 54956 (US).			
(72) Inventors: POIRIER, Malcolm, Daniel ; 3924 Upland Way, Marietta, GA 30066 (US). FISH, Jeffrey, Eldon ; 2405 Cammie Wages Road, Dacula, GA 30019 (US).			
(74) Agents: KLEMBUS, Nancy, M. et al. ; Kimberly-Clark Worldwide, Inc., 401 N. Lake St., Neenah, WI 54956 (US).			Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: **WATER FILTRATION PITCHER WITH PRESSURE FILL**

(57) Abstract

The present invention relates to a fluid filtration system having a pitcher having a handle (20) and a fluid reservoir (14). A filter unit (28) adapted to engage a pressurized fluid source is provided, the fluid from the fluid source flowing through a filter positioned within the filter unit and into the fluid reservoir, the filter unit being slidably disposed within the handle of the pitcher so that the filter unit may be raised upwardly enabling the filter unit to engage the pressurized fluid source.



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

WATER FILTRATION PITCHER WITH PRESSURE FILL

Field of the Invention

5 The present invention relates generally to a water filtration pitcher, and more particularly to a water filtration pitcher with a pressure fill feature.

Background of the Invention

10 As consumers become more health conscious, there is a heightened interest in increasing the quality of water which is utilized for human consumption. In response to this interest, there is much ongoing effort to develop systems which improve water quality by filtering the water to remove contaminants such as chlorine, iron, biological and organic contaminants, microorganisms, lead, and the like which may affect the color, taste, odor
15 and potability of water.

 A variety of filtration systems are currently available which assist in reducing the contaminants in water prior to use or ingestion. Such systems typically include a replaceable filter positioned within some type of housing such as a bottle, canteen, pitcher, counter-top or faucet-mounted device, or the like. It is desirable, in some of these
20 devices, to utilize a filter that is inexpensive and easy to remove and install.

 In some filtration systems, water flowing through the filter may flow at a slower rate than is desired. To increase the usefulness of such filtration devices, the fluid is introduced to the filter under pressure so that the fluid flows through the filter at an increased rate. In such systems, a user will have access to filtered water in a shorter
25 period of time.

 In selected systems, it may be important to provide an indication that a filter has reached the end of its useful life because a filter which is utilized after its effectiveness has diminished may reintroduce contaminants which have been captured by and are contained within the filter into water flowing through the filter.

30 U.S. Patent No. 4,776,956 to Gannaway discloses a combination water filter and container apparatus. As disclosed therein, a cylindrical water filter is mounted within a pair of brackets which are attached to a water receptacle. The cylindrical water filter forms the handle of the water receptacle. The first end of the cylindrical water filter engages screw threads on a cap. The second end of the cylindrical water filter has
35 external threads which engage interior threads on an interior wall of a bracket which is attached to the water receptacle. A channel leads from the second end of the cylindrical

water filter into the interior of the water receptacle. In such a device, the cylindrical water filter must be fixedly positioned within the brackets to enable water to be filtered into the water receptacle. The cylindrical water filter is replaced when the filter media contained therein is exhausted.

5 As the Gannaway device is likely to be lifted by the handle, the disposable cylindrical water filter must be designed to withstand the stresses associated with lifting a full water receptacle. Thus, the cylindrical water filter is likely to be a more robust and expensive filter than is required for merely filtering water. These requirements may increase the costs of the apparatus disclosed by Gannaway. Additionally, the Gannaway
10 device does not provide an indication that the filter has reached the end of its useful life.

Thus, there remains a need for an inexpensive, reliable and simple-to-use water filtration system that permits easy alignment with and filling from a pressurized fluid source such as a faucet.

15 Summary of the Invention

In response to the foregoing problems and difficulties encountered by those of skill in the art, the present invention is directed to a fluid filtration device such as a pitcher which may include a fluid reservoir, a lid and a handle. In selected embodiments, the
20 handle includes an interior, the interior being fluidly connected to the fluid reservoir. The handle may further include an aperture extending into the interior of the handle.

A filter unit is provided which is adapted to slidably engage the aperture in the handle so that at least a portion of the filter unit is slidably disposed within the interior of the handle. The filter unit is adapted to engage a pressurized fluid source such as a
25 faucet, hose or sink sprayer. The filter unit may be raised and lowered within the handle so that at least a portion of the filter unit extends exteriorly of the pitcher to facilitate alignment and engagement of the filter unit to the pressurized fluid source and to facilitate positioning of the pitcher while fluid is flowing from the pressurized fluid source into the pitcher.

30 In some embodiments, the filter unit includes a filter and a connector attached to the filter, the connector being adapted to engage the pressurized fluid source so that pressurized fluid exiting the fluid source flows through the filter into the interior of the handle.

In other embodiments, the filter unit includes a housing or a filter carriage having an
35 inlet and an outlet. A filter is disposed between the inlet and the outlet so that fluid flowing into the inlet must flow through the filter before exiting through the outlet. The inlet may be

adapted to engage the pressurized fluid source. In certain embodiments, a connector adapted to engage the pressurized fluid source may be releasably attached to the inlet of the filter carriage or housing .

In selected embodiments, the filter unit may also have a flexible portion to further
5 facilitate alignment and engagement of the filter unit to the pressurized fluid source.

When the filter has reached the end of its useful life, the filter unit may be slidably removed from the handle so that the filter may be replaced.

The fluid filtration device may also include an indicator attached to the connector and/or inlet which indicates the number of times the pressurized fluid source has been
10 engaged to the filter unit or connector or inlet.

Other objects, advantages and applications of the present invention will be made clear by the following detailed description of embodiments of the invention and the accompanying drawings wherein reference numerals refer to like or equivalent structures.

15 **Brief Description of the Drawings**

Figure 1 is a perspective view of an embodiment of a filtration system according to the present invention.

Figure 2 is a top view of another embodiment of a filtration system according to
20 the present invention.

Figure 3 is a partial cross-sectional side view of an embodiment of the filter unit depicted in Figure 2 taken along line 3-3.

Figure 4 is a partial cross-sectional side view of another embodiment of the filter unit according to the present invention.

Figure 5 is a side view of another embodiment of a filtration system according to
25 the present invention.

Figure 6 is a perspective view of an alternate embodiment of the filtration system according to the present invention.

Figure 7 is a partial side view of the embodiment depicted in Figure 6 wherein the
30 filter unit is connected to a faucet.

Figure 8 is another side view of the embodiment depicted in Figure 6 wherein the filter unit is positioned within the handle.

Figure 9 is another alternate embodiment of the filtration system according to the present invention.

35

Detailed Description

In response to the foregoing challenges which have been experienced by those of skill in the art, the present invention, as depicted in **Figure 1**, is directed to a filtration system 10 which, in selected embodiments, includes a container such as a pitcher 12 having a fluid reservoir 14. A spout 16 may be included in selected embodiments of the pitcher 12. A handle 20 may be formed on the pitcher 12 so that the pitcher may be grasped by the handle 20 and tilted so that fluid contained within the fluid reservoir 14 may flow out of the pitcher 12 through the spout 16. A lid 18 may also be attached to the pitcher 12.

The pitcher 12 of the present invention may be formed in a wide variety of shapes and may be formed from an assortment of materials such as, for example, ceramics, plastics, metals, and combinations thereof. In some embodiments, at least a portion of the pitcher 12 may be formed from a transparent or translucent material such as glass or plastics such as, for example, acrylic, polycarbonate, polyvinylchloride and the like. In these embodiments and as depicted in **Figure 1**, the level of fluid contained within the fluid reservoir 14 may be easily seen by a user without lifting the lid 18.

As best seen in **Figures 1, 3, and 6**, an aperture 24 may be formed in an upper portion of the handle 20, the aperture 24 extending into the interior 22 of the handle 24. The handle 20 may be formed so that the interior 22 of the handle 20 is fluidly connected to the fluid reservoir 14.

As best shown in **Figure 3**, a filter unit 28 is provided and may include a filter 30, a filter carriage or housing 36 and a connector 42. As shown therein, the filter unit 28 is generally cylindrical, although other configurations of the filter unit 28 may also be utilized. The filter unit 28 may be slidably received within the container and, in some embodiments, may be received within the interior 22 of the handle 24. In such an embodiment, the filter unit 28 may be raised upwardly to engage a faucet or other source of pressurized fluid. When sufficient fluid has been filtered into the pitcher 12, the filter unit 28 may be disengaged from the faucet or other source of pressurized fluid and lowered into the interior 22 of the handle 24.

The filter carriage or housing 36 is, in selected embodiments, releasably attached to a connector 42. Although the filter carriage 36 may be attached to the connector 42 by a multitude of mechanisms, the filter carriage or housing 36 depicted in **Figure 3** is attached to the connector 42 via internal threads 38, which may be positioned on an upper portion of the filter carriage or housing 36, which engage the external threads 44 positioned on a lower portion of the connector 42.

The connector 42 may be configured to releasably engage a pressurized fluid source such as a faucet 52, hose, sink sprayer or the like. Although the faucet 52, or other suitable source of pressurized fluid, may be engaged to the connector 42 in a number of ways, a quick disconnect coupling may be utilized to enable a user to easily and quickly
5 connect and disconnect the pitcher 12 from the faucet 52. An abundance of quick disconnect couplings are readily available for use in a wide variety of environments. Such couplings may be rotated to connect the filter unit 28 to the faucet 52, or may simply be pushed into engagement. In some instances, a coupling 54, shown in Figure 6, may be attached to the faucet 52 to enable the faucet to quickly connect to and disconnect from
10 the connector 42.

To attach the connector 42 to the faucet 52, the filter unit 28 may be lifted out of the interior 22 of the handle 20. Once the desired amount of fluid has been filtered into the reservoir 14, the faucet 52 may be disconnected from the connector 42 and the filter unit 28 may be lowered into the handle 20.

15 In the embodiment of the filter unit 28 depicted in Figure 3, the filter 30 is positioned within a chamber 40 of the filter carriage or housing 36. The filter 30 is positioned within the chamber 40 so that fluid flowing into the chamber 40 must pass through the filter 30 before exiting the chamber 40. This may be accomplished in a variety of ways, including adhesively bonding the filter 30 to a lower interior surface of the chamber 40, or
20 positioning seals between the filter 30 and the chamber 40 to prevent fluid from flowing out of the chamber 40 without passing through the filter 30.

A variety of filtration materials may be utilized in the filter 30. The filter 30 which is depicted in Figure 3 is a cylindrical block of activated carbon having a U-shaped cross-section. In such a filter, fluid enters the filter 30 from its exterior surface 32, flows through
25 the filtering material and into the interior 34 of the filter 30.

In other embodiments of the present invention, the filter 30 may be positioned within the connector 42 so that, when the filter has reached the end of its useful life, the filter may be detached from the connector 42 and replaced with a new filter. In some embodiments, the connector 42 and the filter carriage or housing 36 may be formed as a
30 single piece, the filter 30 being disposed therein. In such embodiments, the filter unit 28 may be discarded when the filter 30 has reached the end of its useful life and replaced with a new filter unit.

In the embodiment depicted in Figure 4, the filter 30 is attached to the lower portion of the connector 42. As shown therein, the filter 30 is formed of a block of activated
35 carbon and may be attached to the connector by a variety of mechanism which prevent fluid from flowing out of the connector 42 without passing through the filter 30. Fluid enters

the filter unit 28 through the inlet 46, flows through the passageway 48 and the filter 30. The embodiment of the filter unit 28 depicted in Figure 4 further includes bosses 43 which extend outwardly from the connector 42, which cause the filter unit 28 to extend outwardly from the pitcher 12 so that the filter unit 28 may be easily grasped by a user. In such
5 embodiments, bosses, flanges or other protuberances may be utilized to maintain the filter unit 28 in a partially raised position.

Once connected to the faucet 52, or other suitable source of pressurized fluid, fluid may flow into the connector 42 through the inlet 46. Such fluid may then flow through the passageway 48 formed in the connector 42 and into the chamber 40 of the filter carriage
10 or housing 36. The fluid within the chamber 40 flows through the filtering material and exits the filter carriage or housing 36. In the embodiment shown in Figure 3, the fluid flows into the interior 34 of the filter 30, and exits the filter unit 28 through the outlet 50 in the filter carriage or housing 36. The filtered fluid may then flow from the interior 22 of the handle 20 to the fluid reservoir 14.

15 As shown in Figure 5, the upper portion of the filter unit 28 may be at least partially recessed in the upper portion of the pitcher 12 when the filter unit 28 is in its lowered position.

As shown in Figures 6, 7 and 9, the filter unit 28 may include a flexible hose 56 which may, in selected embodiments, be attached to the interior 22 of the handle 20. In
20 such embodiments, the filter 30 may be positioned in the upper portion of the filter unit 28. The connector 42 may be detached from the filter unit 28 in such embodiments to permit the filter 30 to be replaced when desired. As depicted in Figure 8, the filter unit 28 may be positioned within the pitcher 12 when fluid is not being introduced into the pitcher 12.

In the embodiment shown in Figure 9, the flexible hose 56 is attached to a cup 58
25 which is disposed within the interior of the pitcher 12, the cup being positioned above the handle 20. In such an embodiment, filtered fluid may exit the filter unit 28 and flow directly into the fluid reservoir 14.

In certain embodiments, an indicator may be provided which indicates when the useful life of the filter has been reached. Although a wide variety of indicators may be
30 utilized with the present invention, an indicator suitable for use with the present invention may indicate the number of times the pressurized fluid source has been engaged to the filter unit 28. In such a system, the number of times the fluid source has been engaged to the filter unit 28 or pitcher 12 may be utilized as an approximation of the remaining life of the filter 30. Based on this approximation, a visual or audible indication may be given to a
35 user. In the embodiment depicted in Figure 1, the Indicator 60 displays an increasing number of water droplets to convey to the user the amount of fluid (as approximated by

the number of times the fluid source has been engaged to the filter unit 28) which has been filtered by the filter 30. When the filter 30 and/or the filter unit 28 is replaced, the indicator may be reset or replaced.

- 5 While the invention has been described in detail with respect to specific embodiments thereof, it will be appreciated that those skilled in the art, upon attaining an understanding of the foregoing, may readily conceive of alterations to and variations of the embodiments disclosed herein. Such alterations and variations are believed to fall within the scope and spirit of the present invention and the appended claims.

What is claimed is:

1. A fluid filtration system comprising:
 - a pitcher having a handle and a fluid reservoir;
 - a filter unit adapted to engage a pressurized fluid source such that fluid from the source flows through a filter positioned within the filter unit and into the fluid reservoir,
- 5 the filter unit extendable upwardly from the handle of the pitcher so that the filter unit may be raised to enable the filter unit to engage the pressurized fluid source.
2. The system of claim 1, the filter unit including a connector that is adapted to engage the pressurized fluid source.
3. The system of claim 1, the filter unit being slidably disposed within the handle of the pitcher so that the filter unit may be raised upwardly enabling the filter unit to engage the pressurized fluid source.
4. A fluid filtration system comprising:
 - a fluid reservoir;
 - a container; and
 - a filter unit adapted to engage the container so that the filter unit is removably
- 5 disposed therein, the filter unit having
 - an inlet,
 - an outlet in fluid communication with the inlet and the fluid reservoir, and
 - a filter disposed between the inlet and the outlet, the filter unit being
- 10 adapted to releasably engage a pressurized fluid source so that pressurized fluid exiting the fluid source enters the inlet and passes through the filter prior to exiting the filter unit through the outlet and entering the fluid reservoir.
5. The system of claim 4, the filter unit being slidably engaged within the handle.
6. The system of claim 5, the filter unit being adapted to slide fully out of the handle to facilitate replacement of the filter and to slide at least partially out of the handle to facilitate alignment and engagement of the filter unit to the pressurized fluid source.
7. The filter unit of claim 4, the filter unit further including a flexible portion.

8. A fluid filtration system comprising:
a fluid reservoir;
a handle having an interior, the interior being fluidly connected to the fluid reservoir;
5 a filter unit adapted to be slidably disposed within the interior of the handle, the filter unit including
a filter,
a connector including a fluid passageway, the connector adapted to engage a pressurized fluid source so that pressurized fluid exiting the fluid source enters
10 the fluid passageway and flows through the filter before entering the fluid reservoir.
9. The system of claim 8, the connector releasably attached to the filter.
10. The system of claim 8, the filter unit being adapted to be disposed at least partially out of the interior of the handle to facilitate engagement with the pressurized fluid source while the filter unit is filtering fluid from the pressurized fluid source.
11. The system of claim 8, the filter unit further including a filter carriage adapted to support the filter, the filter carriage being attached to the connector.
12. The system of claim 11, the connector releasably attached to the filter carriage.
13. The fluid filtration system of claim 8 further including an indicator attached to the connector which indicates the number of times the connector has been engaged to the pressurized fluid source.

1/6

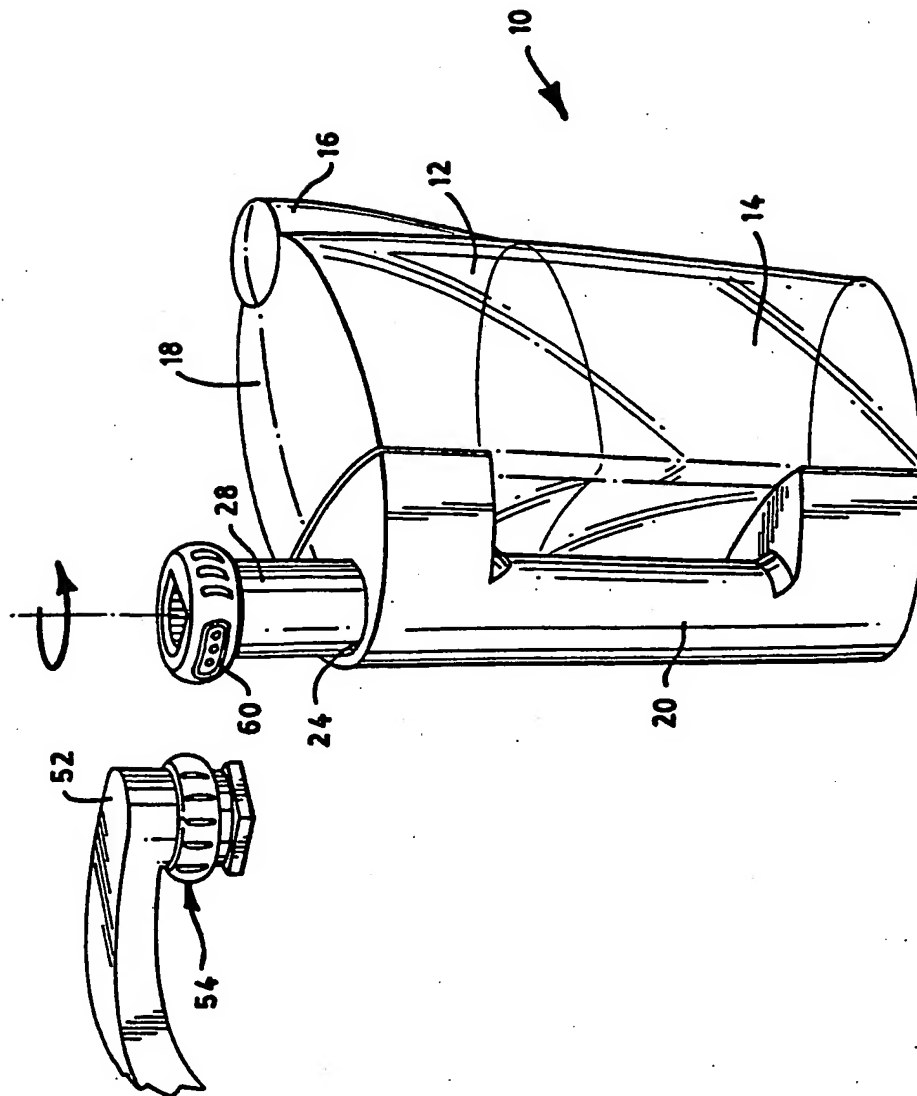


FIG. 1

2/6

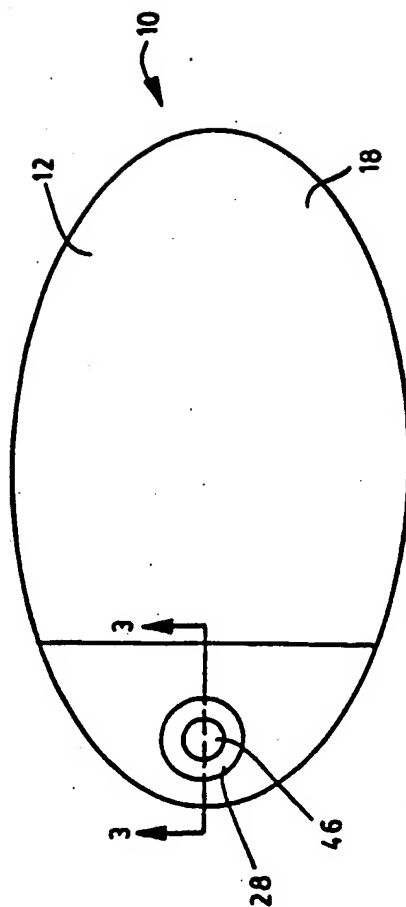


FIG. 2

3/6

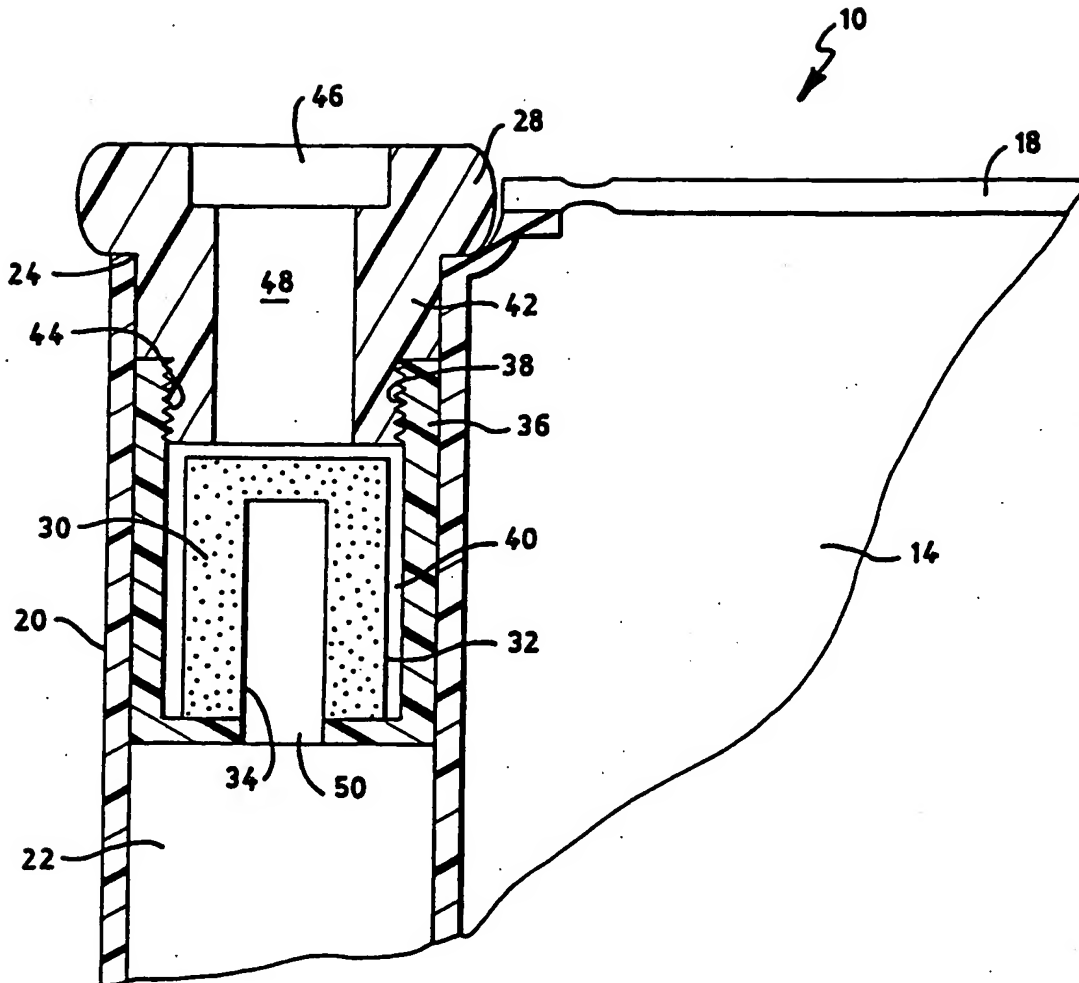


FIG. 3

4/6

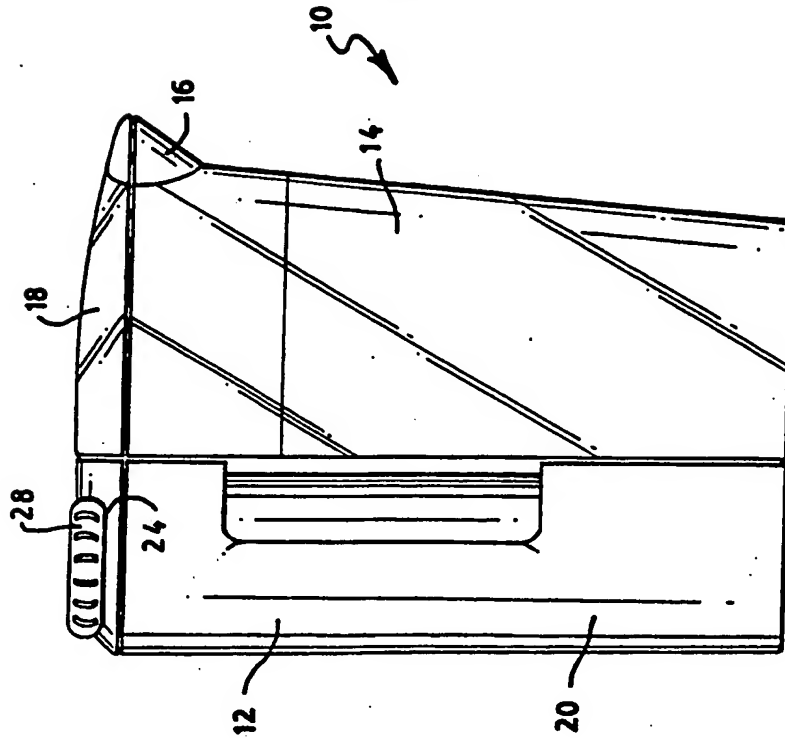


FIG. 5

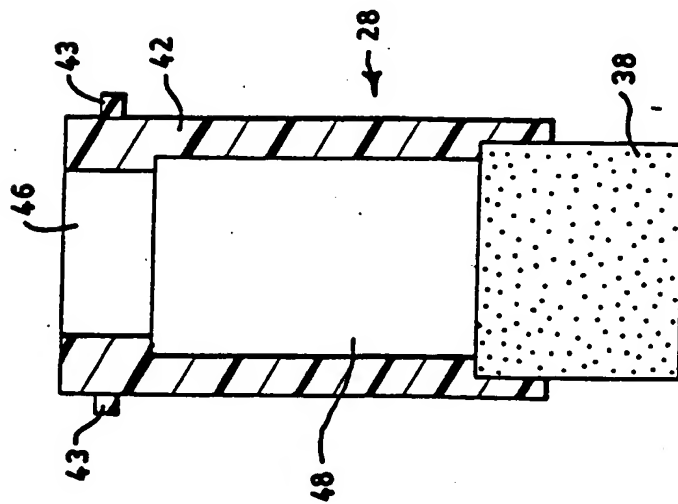


FIG. 4

5/6

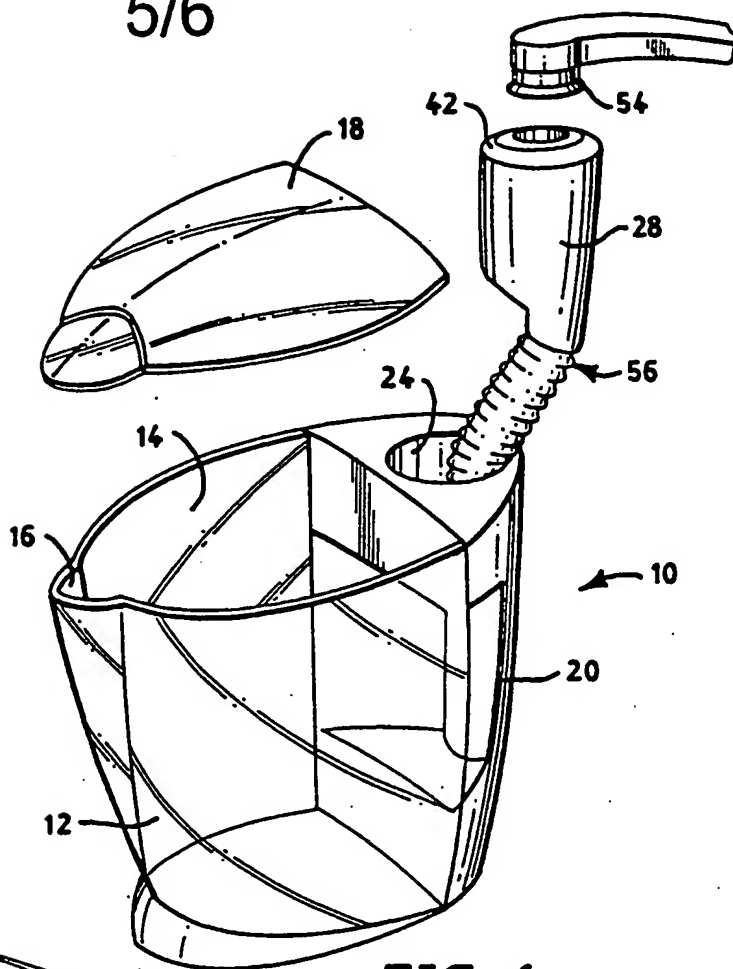


FIG. 6

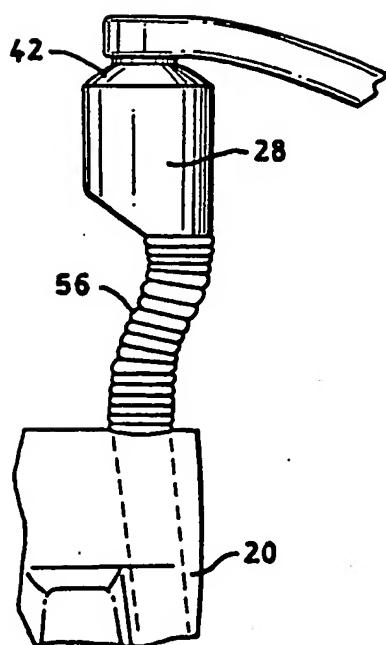


FIG. 7

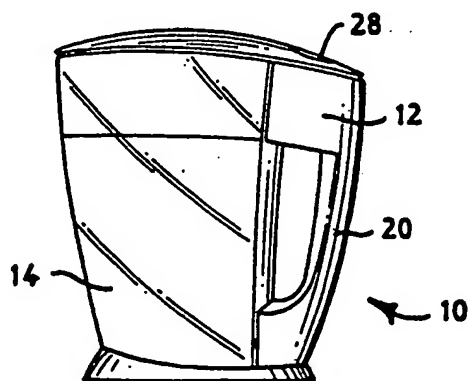


FIG. 8

6/6

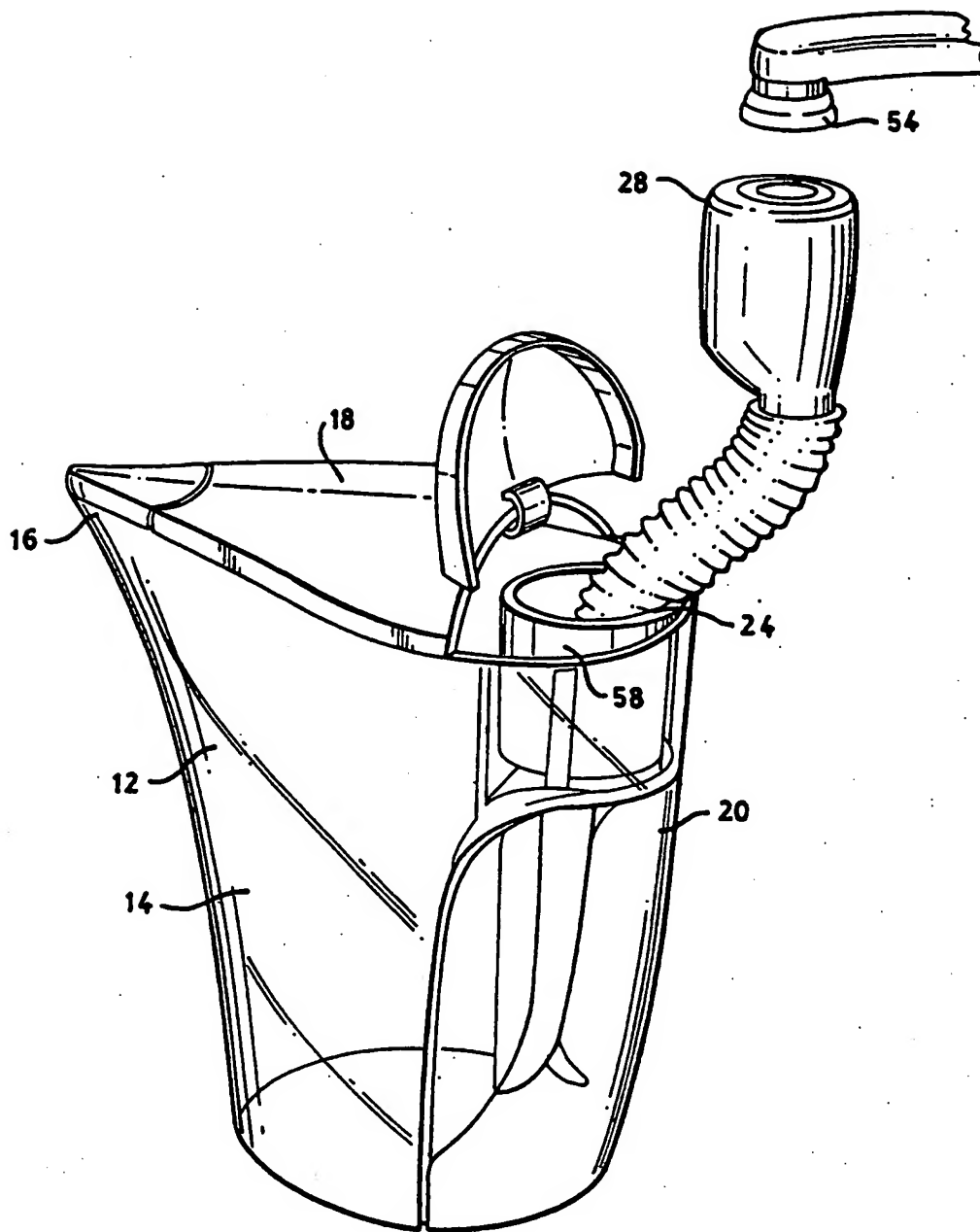


FIG. 9

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/29859

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C02F1/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C02F A47J B01D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 776 956 A (GANNAWAY RICHARD M) 11 October 1988 (1988-10-11) the whole document	1-13
A	DE 41 02 701 A (FINKE ROBERT) 6 August 1992 (1992-08-06) the whole document	1-13
A	US 4 902 411 A (LIN FRANK W G) 20 February 1990 (1990-02-20) figures 2,3	1,2,4,8
A	US 5 078 874 A (SULLIVAN JOHN L) 7 January 1992 (1992-01-07) figure 1	1,2,4,8
	-/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

26 April 2000

Date of mailing of the international search report

08/05/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gruber, M

INTERNATIONAL SEARCH REPORT

In. tional Application No
PCT/US 99/29859

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 560 939 A (NAKAGAWA TATSUZI ET AL) 1 October 1996 (1996-10-01) figures 14,15	1,2,4,8
P,A	US 5 928 506 A (BAE KYUNG SUK) 27 July 1999 (1999-07-27) figure 1	1,2,4,8
A	US 5 273 649 A (MAGNUSSON KRISTOFER J ET AL) 28 December 1993 (1993-12-28) figure 8	4,8,9

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Patent Application No

PCT/US 99/29859

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4776956 A	11-10-1988	NONE	
DE 4102701 A	06-08-1992	NONE	
US 4902411 A	20-02-1990	NONE	
US 5078874 A	07-01-1992	CA 2050151 A	06-05-1992
US 5560939 A	01-10-1996	JP 1275111 A	02-11-1989
		JP 1836567 C	11-04-1994
		JP 5044893 B	07-07-1993
		JP 1291915 A	24-11-1989
		JP 1826099 C	28-02-1994
		JP 5030608 B	10-05-1993
		AT 132796 T	15-01-1996
		AU 618801 B	09-01-1992
		AU 3380089 A	02-11-1989
		CA 1327110 A	22-02-1994
		DE 68925379 D	22-02-1996
		DE 68925379 T	15-05-1996
		EP 0339642 A	02-11-1989
		KR 9702296 B	27-02-1997
		RU 2070111 C	10-12-1996
US 5928506 A	27-07-1999	CN 1186143 A	01-07-1998
US 5273649 A	28-12-1993	NONE	

BEST AVAILABLE COPY